B M TIBBITTS AND SONS (PWS 7220009)
SOURCE WATER ASSESSMENT FINAL REPORT

March 5, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for B M Tibbitts and Sons, Fremont County, Idaho,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The B M Tibbitts and Sons drinking water system consists of two well sources. The wells are located in close proximity to one another are both approximately 160 feet deep. Therefore, both wells have similar delineation zones and potential contaminant sources. Wells #1 and #2 have several recorded detections of verified microbial contaminants. With the exception of trace amounts of the inorganic contaminants (IOCs) nitrate and a single detected Maximum Contaminant Level (MCL) exceedance of beryllium levels, this system has high quality drinking water. The system has no recorded synthetic organic contaminants (SOCs) or volatile organic contaminants (VOCs). The system has a moderate susceptibility rating for VOC and SOC contamination. Because of historic detections of coliform bacteria and beryllium the B M Tibbitts drinking water system automatically has a high susceptibility rating for microbial contamination and the IOC beryllium. B M Tibbitts and Sons should be aware that the potential for contamination is substantial due to the presence of major agricultural land use practices. The delineation zone for this system crosses a nitrate priority related to the high level of agriculturally related fertilizer that is routinely applied to cultivated land.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For B M Tibbitts and Sons, drinking water protection activities should focus on finding and eliminating the source of microbial contamination. Microbial contamination is a serious threat to human health. B M Tibbitts and Sons should also correct any deficiencies outlined in the 1996 sanitary survey. A sanitary survey inspection is conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity. There should also be a focus on the implementation of practices aimed at reducing the leaching of agricultural chemicals and nitrate from agricultural land within the designated source water areas. Given that much of the designated protection area is outside the direct control of B M Tibbitts and Sons, partnerships with state and local agencies, and industry groups should be established. These collaborative efforts are critical to the success of drinking water protection. All wells should maintain sanitary survey standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil and Water Conservation District, and the Natural Resources Conservation Service. A community with a fully developed drinking water protection program will incorporate many strategies. For assistance in developing protection strategies please contact the Idaho Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR B M TIBBITTS AND SONS, IDAHO FALLS, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is attached.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The public drinking water system for B M Tibbitts and Sons is comprised of two ground water wells that serve approximately 60 people through a single connection. The wells are located within close proximity of one another at the company's operations 8 miles north-northwest of Rexberg, in Fremont County (Figure 1).

There have been several repeat detections of microbial contamination in ground water. Additionally, there have been detections of trace amounts of the IOC nitrate at levels below the current MCL and a single detection of beryllium that exceeds the MCL for that contaminant. No VOCs or SOCs have been detected in the well water. The delineation zone for Wells #1 and #2 does cross a nitrite priority area.

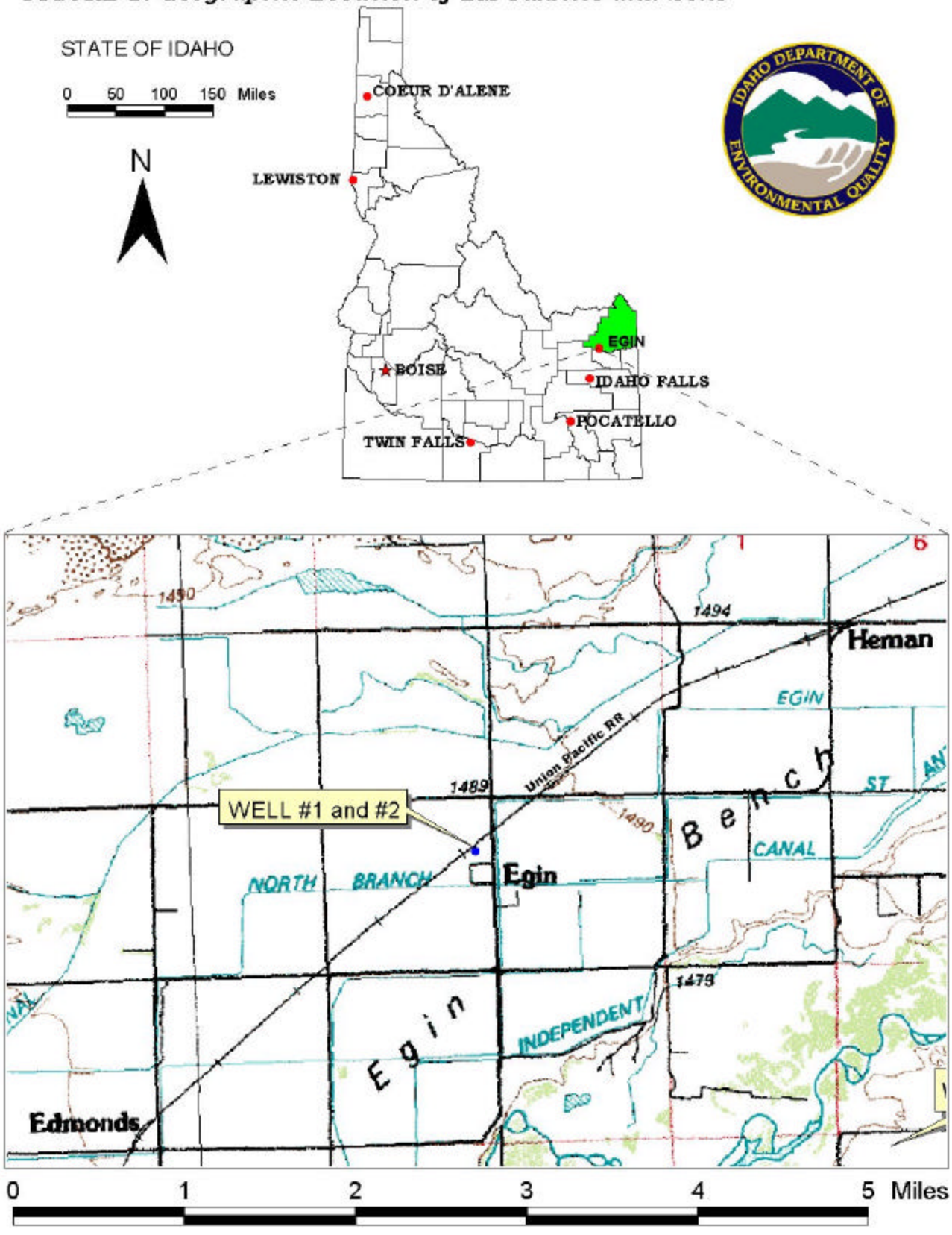
Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with Washington Group, International (WGI) to perform the delineations using a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the upper Eastern Snake River Plain (ESRP) aquifer in the vicinity of both B M Tibbitts and Sons wells. The computer model used site specific data, assimilated by WGI from a variety of sources including the B M Tibbitts and Sons operator report, other local area well logs, and hydrogeologic reports (detailed below).

The ESRP is a northeast trending basin located in southeastern Idaho. Ten thousand square miles of the basin are primarily filled with highly fractured layered Quaternary basalt flows of the Snake River Group, which are intercalated with terrestrial and lacustrine sediments along the margins (Garabedian, 1992, p. 5). Individual basalt flows range from 10 to 50 feet in thickness and average 20 to 25 feet (Lindholm, 1996, p. 14). Basalt is thickest in the central part of the eastern plain and thins toward the margins. Whitehead (1992, p. 9) estimates the total thickness of the flows to be as great as 5,000 feet. A thin layer (0 to 100 feet) of windblown and fluvial sediments overlies the basalt.

The plain is bound on the northeast by rocks of the Yellowstone Group (mainly rhyolite) and Idavada Volcanics to the southwest. The Snake River flows along part of the southern boundary and is the only drainage that leaves the plain. Rivers and streams entering the plain from the south are tributary to the Snake River. Other than the Big and Little Wood rivers, rivers entering from the north vanish into the highly transmissive basalts of the Snake River Plain aquifer.

FIGURE 1. Geographic Location of BM Tibbitts and Sons



The layered basalts of the Snake River Group host one of the most productive aquifers in the United States. The aquifer is generally considered unconfined, yet it may be locally confined in some areas because of inter-bedded clay and dense unfractured basalt (Whitehead, 1992, p. 26). Whitehead (1992, p. 22) reports that well yields of 2,000 to 3,000 gal/min are common for wells open to less than 100 feet of the aquifer. Lindholm (1996, p. 18) estimates aquifer thickness to range from several hundred feet near the plain's margin to thousands of feet near the center.

The majority of aquifer recharge results from surface water irrigation activities (incidental recharge), which divert water from the Snake River and its tributaries (Ackerman, 1995, p. 4, and Garabedian, 1992, p. 11). Natural recharge occurs through stream losses, direct precipitation, and tributary basin underflow.

Regional ground water flow is to the southwest paralleling the basin (Cosgrove et al., 1999, p. 21; deSonneville, 1972, p. 78; Garabedian, 1992, p. 48; and Lindholm, 1996, p. 23). Ground water flow direction at the local scale is thought to be highly variable due to preferential flow paths through the fractured and layered basalts.

The delineated source water assessment area for both wells is similar because both wells are of similar depth and situated in close proximity to one another. The overlapping delineation zones can best be described as wedge-shaped corridors approximately 7 miles long and 2 miles wide extending to the northeast of B M Tibbitts and Sons (Figure 2). The delineation zone consists of a 3-year, 6-year and 10-year TOT. The actual data used by WGI in determining the source water assessment delineation areas are available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of groundwater contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area of the B M Tibbitts and Sons drinking water system consists of the company's production and shipping facilities, a highway and a railroad right-of-way and irrigated agricultural land.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with

potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in April 2001. The first phase involved identifying and documenting potential contaminant sources within the B M Tibbitts and Sons Source Water Assessment Areas (Figure 2) through the use of computer databases and Geographic Information System maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

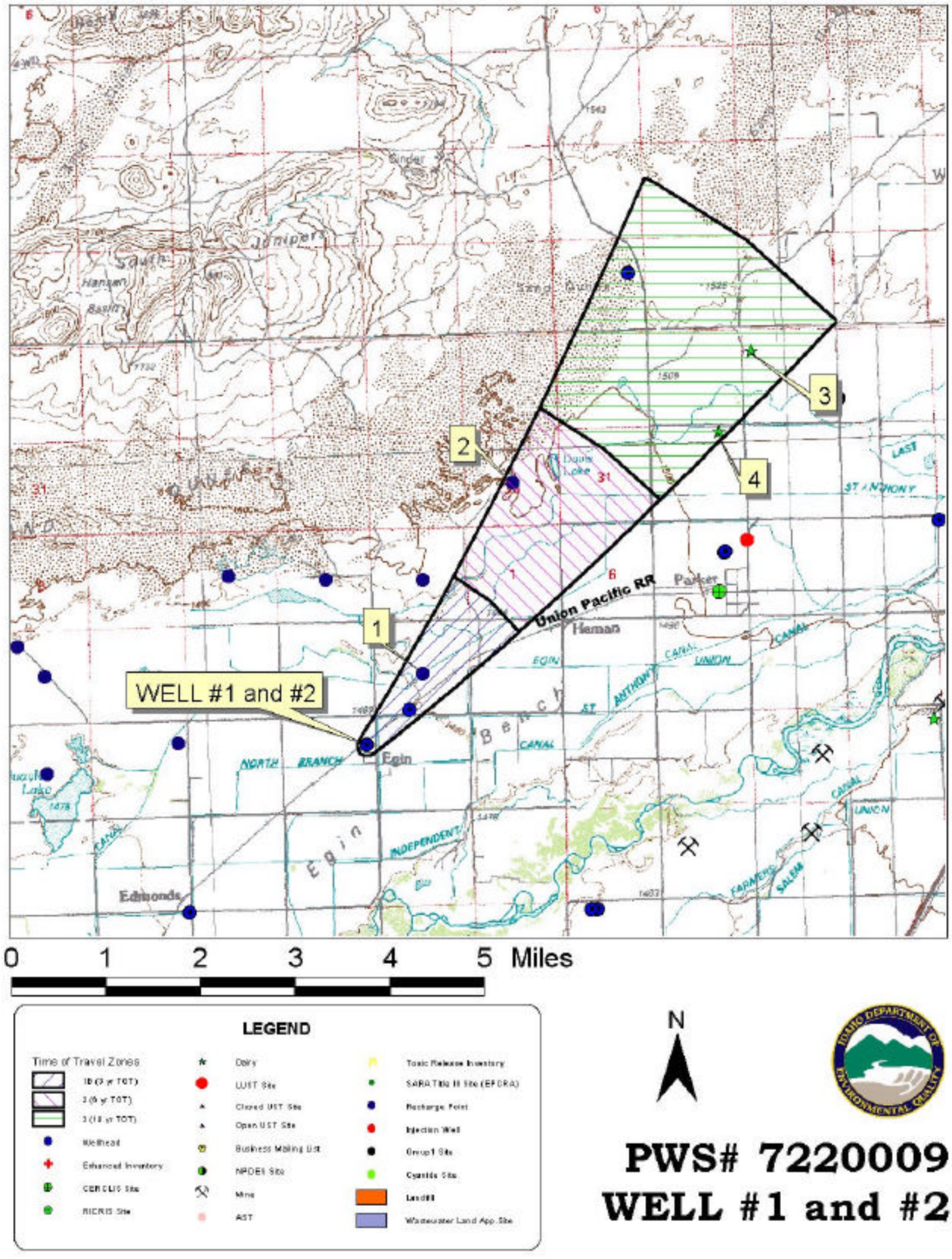
The delineated source water area for both wells encompasses similar corridors of land extending from the well sites to the northeast. Both well delineation zones contain the same five (5) potential contaminant sites consisting of two permitted (not currently being used) groundwater injection wells, two dairies and the Union Pacific Railroad (Table 1).

Table 1. B M Tibbitts and Sons Wells #1 & #2, Potential Contaminant Inventory

SITE #	Source Description	TOT Zone[1] (years)	Source of Information	Potential Contaminants[2]
1	Injection well	3	Database Research	IOC
2	Injection well	6	Database Research	IOC
3	Dairy	10	Database Research	IOC, M
	Dairy	10	Database Research	IOC, M
3	Rail Road	3	Database Research	IOC, VOC, SOC, M

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical, M = Microbials

Figure 2. BM Tibbitts and Sons Delineation Map and Potential Contaminant Source Locations



Section 3. Susceptibility Analyses

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity ranks moderate in potential risk for both B M Tibbitts and Sons wells (Table 2). This is a result of the soils being in the poor to moderate class and the fact that the water table is less than 300 feet from the surface. The drill hole log for Well #2 also indicates that there is a lack of laterally extensive low-permeability units to retard the downward movement of contaminants.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

Little is known about the construction parameters for Well #1 since there is no well log available for this drill hole. For that reason the assumption is made that the well does not meet state standards. Therefore, the well scores in the medium risk for well construction.

The well construction score for Well #2 is in the low-risk range. There is a log for Well #2 that indicates that the casing and annular seal were completed in basalt probably resulting in a good seal and a low likelihood of surface contamination descending to the water table. Nevertheless, Well #2 does not appear to meet current public water system (PWS) construction standards due to an insufficient casing thickness. Specifically, the well casing has an 8-inch diameter and has a casing thickness of only 0.250-inch. The recently upgraded casing requirement is 0.322-inch thickness for 8-inch casing. Though the well may have been in compliance with standards when it was completed in 1991, current PWS well construction standards are more stringent. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells.

Potential Contaminant Source and Land Use

Although there are only five known potential contaminant sources within both wells' delineation zones the system automatically rates high risk for the IOC beryllium, and high risk for microbial contaminants (i.e. bacteria) in the land use portion of the scoring. This automatic high-risk rating is due to the presence of historic elevated levels of beryllium and repeated detections of coliform bacteria. It should also be noted that a variety of hazardous materials routinely transported along the railroad could pose considerable danger to this system's water supply if a spill were to occur. Land use related scoring for SOCs (i.e. pesticides) and VOCs (i.e. petroleum products) rated in the medium risk range. It should be noted that the delineation zones for both wells fall within a nitrate priority area due to high levels of nitrogen fertilizer use, herbicide use, and total ag-chemical use. Although nitrite is present, the wells have consistently recorded this IOC contaminant at levels below the nitrate MCL of 10 mg/l. No VOCs or SOCs have been detected in well water for this system.

Final Susceptibility Ranking

A detection above a drinking water standard MCL or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores.

Table 2. Summary of B M Tibbitts and Sons Susceptibility Evaluation

Well	**Susceptibility Scores[1]**									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	M	M	M	M	M	H*	M	M	H*
Well #2	M	M	M	M	M	L	H*	M	M	H*

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility, H* Final risk rating is automatically high due to historic high levels of beryllium and repeated detections of microbials, IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

Overall, both B M Tibbitts and Sons wells rate high risk for the IOC beryllium and for microbial contamination and moderate risk for the VOC and SOC categories of potential contamination. The poor to moderate drained nature of the soils, the intense agricultural practices, the high county-wide use of agricultural chemicals, repeated detections of microbial contamination and the presence of potential contaminant sources are major factors in this scoring.

Section 4. Options for Drinking water protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For B M Tibbitts and Sons, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey. Coliform bacteria in drinking water represent a substantial threat to human health. If microbial contamination recurs, it will be imperative that the source of microbial contamination be found and eliminated. Additionally, there should be a focus on the implementation of practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas and awareness of the potential contaminant sources in the area. Given that much of the designated protection areas are outside the property boundary of the B M Tibbitts and Sons, partnerships with state and local agencies, and ag-industry groups should be established. These collaborative efforts are critical to the success of drinking water protection. The well should be maintained to sanitary survey standards regarding wellhead protection. Continued vigilance in keeping the wells protected from surface flooding can also keep the potential for contamination reduced. Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the short term. Drinking water protection activities for agriculture should be coordinated with the Idaho Department of Agriculture, the Soil Conservation Commission, the local Soil and Water Conservation District, and the Natural Resources Conservation Service.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Idaho Falls Regional DEQ Office (208) 528-2650

State DEQ Office (208) 373-0502

Website: http://www2.state.id.us/deq

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1-800-962-3257 for assistance with wellhead protection strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund@ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

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Garabedian, S.P., 1992, Hydrology and Digital Simulation of the Regional Aquifer System, Eastern Snake River Plain, Idaho, U.S. Geological Survey Professional Paper 1408-F, 102 p.

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Lindholm, G.F., 1996, Summary of the Snake River Plain Regional Aquifer-System Analysis in Idaho and Eastern Oregon, U.S. Geological Survey Professional Paper 1408-A, 59 p.

Whitehead, R.L., 1992, Geohydrological Framework of the Snake River Plain Regional Aquifer System, Idaho and Eastern Oregon, U.S. Geological Survey Professional Paper 1408-B, I-FY92, 32 p.

Attachment A

B M Tibbitts and Sons Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.273)

2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report

BM TIBBITTS AND SONS WELL #1 Public Water System Number 7220009 11/19/01 3:08:38 PM

1. System Construction		SCORE				
Drill Date	1/1/1900					
Driller Log Available	NO					
Sanitary Survey (if yes, indicate date of last survey)	YES	1996				
Well meets IDWR construction standards	NO	1				
Wellhead and surface seal maintained	NO	1				
Casing and annular seal extend to low permeability unit	NO	2				
Highest production 100 feet below static water level	YES	0				
Well located outside the 100 year flood plain	YES	0				
Total System Construction Score		4				
2. Hydrologic Sensitivity						
Soils are poorly to moderately drained	YES	0				
Vadose zone composed of gravel, fractured rock or unknown	YES	1				
Depth to first water > 300 feet	NO	1				
Aquitard present with > 50 feet cumulative thickness	NO	2				
Total Hydrologic Score		4				
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score	
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2	
Farm chemical use high	YES	2	0	2		
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	NO	YES	
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2	
Potential Contaminant / Land Use - ZONE 1B						
Contaminant sources present (Number of Sources)	YES	1	0	0	0	
(Score = # Sources X 2) 8 Points Maximum		2	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0		
4 Points Maximum		0	0	0		
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0	
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4	
Total Potential Contaminant Source / Land Use Score - Zone 1B		6	4	4	4	
Potential Contaminant / Land Use - ZONE II						
Contaminant Sources Present	YES	2	0	0		
Sources of Class II or III leacheable contaminants or	NO	0	0	0		
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2		
Potential Contaminant Source / Land Use Score - Zone II		4	2	2	0	
Potential Contaminant / Land Use - ZONE III						
Contaminant Source Present	YES	1	0	0		
Sources of Class II or III leacheable contaminants or	NO	0	0	0		
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0		
Total Potential Contaminant Source / Land Use Score - Zone III		1	0	0	0	
Cumulative Potential Contaminant / Land Use Score		15	8	10	6	

4. Final Susceptibility Source Score		11	10	10	10
5. Final Well Ranking		High	Moderate	Moderate	High

Ground Water Susceptibility Report

BM TIBBITTS AND SONS WELL #2 Public Water System Number 7220009 11/16/01 11:32:43 AM

1. System Construction		SCORE
Drill Date	10/27/91	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1996
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	YES	0
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		1

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		4

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	NO	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	1	0	0	0
(Score = # Sources X 2) 8 Points Maximum		2	0	0	0
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
4 Points Maximum		0	0	0	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		6	4	4	4
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		4	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	

Total Potential Contaminant Source / Land Use Score - Zone III	1	0	0	0
Cumulative Potential Contaminant / Land Use Score	15	8	10	6
4. Final Susceptibility Source Score	8	7	7	7
5. Final Well Ranking	High	Moderate	Moderate	High